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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,683	10/02/2003	David Borcherding	USA3960 US CNT	8394

5487 7590 12/06/2007

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EXAMINER	
BERCH, MARK L	

ART UNIT	PAPER NUMBER
1624	

NOTIFICATION DATE	DELIVERY MODE
12/06/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/677,683	BORCHERDING ET AL.	
	Examiner	Art Unit	
	/Mark L. Berch/	1624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2007* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-10,12-16,18,19,21-35,48 and 49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10,12-16,18,19,21-35,48 and 49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. *09/998,976* .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _ .
4)☐ Interview Summary (PTO-413) Paper No(s). _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/19/2007 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-10, 12-16, 18-19, 21, and 49 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Generally speaking, these claims fall into four categories:

I. Treatment of cancers, which are hyperproliferative disorders: Claims 4-10, 49

II. Treatment of other, non-cancerous hyperproliferative disorders: Claims 12-14

III. Treatment of both: Claim 3

IV. Prevention of apoptosis: Claims 15-16, 18-19, and 21. Claim 21 does not actually mention apoptosis, but judging from the specification, this protection arises from the prevention of apoptosis.

The treatment of cancers generally, and hyperproliferative disorders generally cannot possibly be considered enabled. Nor can the prevention of apoptosis. The examiner notes for the record that these are opposing utilities. That is, apoptosis (programmed cell death) is the body's most powerful anti-tumor mechanism. Suppression of apoptosis means suppression of the body's anti-cancer regime. Important anti-cancer drugs such as paclitaxel and tamoxifen operate by inducing apoptosis. The examiner knows of no anti-cancer drug which operates by suppressing apoptosis; such a mechanism would make no sense. Indeed, it is becoming increasingly clear that the most important determinant of tumor resistance may be a generalized resistance to induction of apoptosis. That is, tumor cells manage to survive because they are resistant to the body's apoptosis mechanisms. Drugs that suppress apoptosis would be expected make cancer worse.

Applicants stated previously that they agree that "apoptosis and hyperproliferation are opposite" but say that they are similar in that they "share a similarity of requiring a degree of cell cycling." The examiner does not see much of a similarity. But even if true, it does not at all get to the essential problem here, which is that an agent which suppresses apoptosis would be reasonably expected to make cancer worse, not better.

Applicants now respond, "Induction of apoptosis is alleged as the mechanism of action of drugs such as paclitaxel and tamoxifen. But such effect cannot be absolute if they were completely successful in inducing apoptosis the organism would not survive, all the cells having died a programmed death. The point of this is that treatment is relative and measured. So while some apoptosis may be advantageous or desired at certain times, apoptosis is not always required in every cell." It is of course true that apoptosis is not "absolute"; it is selective. The body has several different mechanisms by which it tells

defective cells, especially cells that are proliferating when they should not, to commit suicide.

With regard to the paragraph bridging pages 11-12 of the remarks, it is not seen what this has to do with the essential problem here. Applicants state that "Dead cells do not proliferate." Agreed, dead cells do not proliferate. But these compounds suppress the body's most important mechanism --- apoptosis --- for turning proliferating cells into dead-cells-which-do-not-proliferate.

Applicants state, "both apoptosis and proliferation require transcription." Of course this is true. Transcription is the process by which genetic information from DNA is transferred into RNA. It is an essential step in generation of functional proteins, and in fact, it is such a fundamental biochemical operation that all significant processes in human cells involve transcription. That is, this commonality underlies not just "apoptosis and proliferation", but any bodily process that is under the control of a gene. Applicants continue, "Water is essential for life, but may cause drowning. Yet no one advocates water deprivation to save lives." It is agreed that too much of a good thing can be bad, but what does that have to do with the fact that these compounds are said to suppress the body's most power method of keeping check on tumors? Applicants continue, "He concludes that based on the belief that apoptosis is essential to counter tumors, suppressing apoptosis would make matters worse." Actually, the examiner did not go as far as "apoptosis is essential to counter tumors", merely that apoptosis is the body's most powerful anti-tumor mechanism, so that suppressing it, on its face, would be expected to make things work. Applicants continue, "Especially for tumors resistant to apoptosis, interfering with cell cycling thereby inhibiting proliferation would logically be an advantage and would not

make the cancer worse." First, the claims are not limited to "tumors resistant to apoptosis". Second, "tumors resistant to apoptosis" means that apoptosis is not enough keep them under control, not that apoptosis is utterly useless.

Applicants state, "The Examiner appears to rely on a per se rule that treatment of cancers and hyperproliferative disorders cannot be considered enabled." The examiner is not. The examiner is applying the relevant case law and applying the Wands-anlaysis to the particulars of these claims.. If the examiner were arguing that, all of the detailed analysis would not have been made.

By way of background, four cases are of particular relevance to the question of enablement of a method of treating cancers broadly or even generally:

In ***In re Buting***, 57 CCPA 777, 418 F.2d 540, 163 USPQ 689, the claim was drawn to "The method of treating a malignant condition selected from the group consisting of leukemias, sarcomas, adenocarcinomas, lymphosarcomas, melanomas, myelomas, and ascitic tumors" using a small genus of compounds. The Court decided that humans testing "limited to one compound and two types of cancer" was not "commensurate with the broad scope of utility asserted and claimed".

. In ***Ex parte Jovanovics***, 211 USPQ 907 the claims were drawn to "the treatment of certain specified cancers in humans" by the use of a genus of exactly two compounds, the N-formyl or N-desmethyl derivative of leurosine. Applicants submitted "affidavits, publications and data" for one of the compounds, and a dependent claim drawn to the use of that species was allowed. For the other, no data was presented, applicants said only that the other derivative would be expected to be less effective; claims to the genus were refused.

In ***Ex parte Busse***, et al., 1 USPQ2d 1908, claims were drawn to A therapeutic method for reducing metastasis and neoplastic growth in a mammal" using a single species. The decision notes that such utility "is no longer considered to be "incredible", but that "the utility in question is sufficiently unusual to justify the examiner's requirement for substantiating evidence. Note also that there is also a dependent claim 5 which specified "wherein metastasis and neoplastic growth is adenocarcinoma, squamous cell carcinoma, melanoma, cell small lung or glioma." The decision notes that "even within the specific group recited in claim 5 some of the individual terms used actually encompass a relatively broad class of specific types of cancer, which specific types are known to respond quite differently to various modes of therapy."

In ***Ex parte Stevens***, 16 USPQ2d 1379 a claim to " A method for therapeutic or prophylactic treatment of cancer in mammalian hosts" was refused because there was "no actual evidence of the effectiveness of the claimed composition and process in achieving that utility."

In response applicants, state, "However, case law relates to law not to science". This is true but not the point. These cases reflect the legal treatment of claims drawn to the treatment of cancer broadly, and the examiner will be guided by them. Thus, while applicants state that these cases "cannot be properly relied upon for teachings of the skills in the art ...To the extent that outdated teachings of the level of skill in the art....", applicants have not identified any "outdated teachings" being relied on.

Applicants argue that the facts of these cases are "sound bites by themselves with no particular tie to the instant fact situation." Of course the facts of each case are different. However, the legal conclusions form a proper background for the present circumstances.

Thus, for example, in Busse, of the claim 5 language "adenocarcinoma, squamous cell carcinoma, melanoma, cell small lung or glioma." the decision says that this language does "actually encompass a relatively broad class of specific types of cancer, which specific types are known to respond quite differently to various modes of therapy." That fact is true in Busse and it is true here as well. That list of Busse is comparable, indeed, smaller, than the list of claim 5, and therefore, such a determination is quite relevant here.

In the second full paragraph on page 12, applicants state, "Inhibiting that common mechanism is at the heart of the present invention." First, such assertions are hardly unprecedented in cancer. Suppression of apoptosis is alleged as a common mechanism. DNA intercalation is to be a common mechanism. Oncology has decades of experience with so called "silver bullet" techniques, such as switching the mitochondria back on inside cancer cells, suppression of apoptosis, Telomerase inhibition, angiogenesis inhibition, DNA intercalation and other methods, all of which assert a common mechanism that can be attacked and therefore treat cancer generally. One of ordinary skill in the art knows that such results have never been obtained, or, more precisely, the skill in the art is too low to get such techniques to work generally. Second, applicants hardly have a "common mechanism". Second, it is not at all clear what this "common mechanism" actually is. The remarks refer to "cycling", but this is a very generally term, as there are many processes involved in this.

In this regard, it appears that applicants may believe that they have uncovered this common mechanism, or, alternatively, they have uncovered a method of inhibiting it. Nothing could be further from the truth. That cancer involves uncontrolled cell growth has been known for more than a century, and CDK inhibitors have been known since 1993. If

simply inhibiting CDKs were a silver bullet against cancer, then cancer would have been conquered years ago. The opposite is true. For example, Flavopiridol has been in human clinical trials since 1997. The results have been quite disappointing; in areas such as advanced colorectal cancer, soft tissue sarcoma, non-small cell lung cancer, and advanced gastric carcinoma, the drug has come up negative, although investigations continue in a certain type of CLL and in other areas. The notion that CDK inhibitors are effective against cancer generally, or against broad areas of cancers, is inconsistent with what has been discovered so far. Indeed, so far as the examiner is aware, as of the effective filing date of this application, no CDK inhibitor had been itself established as effective for the treatment of any kind of cancer, let alone an entire class of cancers.

Pursuant to ***In re Wands***, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988), one considers the following factors to determine whether undue experimentation is required: (A) The breadth of the claims; (B) The nature of the invention; (C) The state of the prior art; (D) The level of one of ordinary skill; (E) The level of predictability in the art; (F) The amount of direction provided by the inventor; (G) The existence of working examples; and (H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure. Some experimentation is not fatal; the issue is whether the amount of experimentation is "undue"; see ***In re Vaeck***, 20 USPQ2d 1438, 1444.

The analysis is as follows:

(1) Breadth of claims.

(a) Scope of the compounds. Due to the deeply nested nature of the Ra variable (Ra can be NR1R3, where R1 can be a choice with Q and two W groups, and Q can have another R3 substituent, and W can be assorted rings with B (which has the R6 substituent) and

several X substituents, which X substituents can have R4 and R5 substituents on them, variables which have very broad definitions), the claim covers millions if not billions of compounds.

The traverse on this point is not persuasive. The staggeringly large size of the genus must be a factor in the direction of lack of enablement. Applicants previously pointed to the species listed in Table 1, but this in no way limits the scope of the claims.

Applicants state, "without indication that any one of the compounds could not be made or used as claimed, the number of compounds usable had no relevance to an enablement rejection." It is not clear why not. Under the ***Wands*** rubric, the breadth of the claims is one of the factors to be taken into account, along with many others.

Applicants earlier stated, "The ---Z-Ra portion is crafted to reduce basicity of the nitrogen to which the portion is attached. Although the number of radicals that achieve this result is large, as a group they achieve the identical result." The examiner agrees with the first sentence but not the second. The ---Z-Ra portion does more than that. It also affects the size, shape and electronic distribution of the molecule. And indeed, applicants seem to argue against the notion that these ZRa groups achieve an "identical result."

Applicants also stated, "The –Z-Ra portion of the molecule is not responsible for binding the CDK." Applicants go on to explain that this part of the molecule affect the degree to which there is "uptake of the compound by red blood cells", and applicants explain which this is very important, that "when the compound is sequestered within a red blood cell the compound cannot freely pass from the plasma to target tissues." The examiner agrees that the test measures the distribution ratio of the tested compound between the red

blood cells and plasma. How is this an argument for enablement? This is basically an argument for the fact that –Z-Ra portion of the molecule is not irrelevant, but plays an essential role in making sure that the molecule as a whole can get to where it is needed. It does show that for some compounds, the ratio is unfortunately rather high. The examiner's assumption was that all parts of the molecule are important.

With regard to the paragraph bridging pages 12-13, the examiner is not entirely sure what applicants are getting at. The genus covers millions if not billions of compounds, a calculation that applicants do not dispute. Instead, applicants argue that this part of the molecule affects uptake of the compound by red blood cells. The examiner does not disagree, and agrees that the tests show that the distribution ratio of the tested compound between the red blood cells and plasma varies widely among the claims compounds. This establishes that this is an important part of the molecule, and the test may well indicate that for come compounds, the ratio is just too high. But what does that have to do with the size of the genus? Now, applicants argue, or, at least, appear to argue, that this is not the "business end" of the molecule. The entire molecule is considered. Applicants argue that in terms of interacting with CDKs, the compounds provide only "minor variation". A look at e.g. page 125 shows that variations are not minor by any standard.

(b) Scope of the diseases covered. The coverage is immense. There are hundreds of types of cancers and tumors. They can occur in pretty much every part of the body. Here are some assorted categories:

A. CNS cancers cover a very diverse range of cancers in many categories and subcategories. There are an immense range of neuroepithelial tumors. Gliomas, the most common subtype

of primary brain tumors, most of which are aggressive, highly invasive, and neurologically destructive tumors are considered to be among the deadliest of human cancers. These are any cancers which show evidence (histological, immunohistochemical, ultrastructural) of glial differentiation These fall mostly into five categories. There are the astrocytic tumors (Astrocytomas): Pilocytic astrocytoma (including juvenile pilocytic astrocytoma, JPA, and pediatric Optic Nerve Glioma) Diffuse astrocytomas (including Fibrillary astrocytomas, Protoplasmic astrocytomas and Gemistocytic astrocytomas), Anaplastic astrocytomas (including adult Optic Nerve Glioma), Glioblastoma multiforme (GBM), gliosarcoma and giant cell glioblastoma, and Pleomorphic xanthoastrocytoma. GBM exists in two forms, primary and secondary, which have very different clinical histories and different genetics, but GBM is considered to be one clinical entity. Second, there are the oligodendroglial tumors (Oligodendrogliomas): Low grade Oligodendroglioma and Anaplastic Oligodendroglioma. Third, there is oligoastrocytomas ("mixed glioma"), a type of tumor with both astrocytoma & oligodendroglioma features. The fourth type is the Ependymomas, which are intracranial gliomas, including Papillary Ependymoma, Myxopapillary ependymoma, tanycytic ependymoma, Anaplastic ependymoma and subependymal giant-cell astrocytomas. A fifth type is the Gangliogliomas (glioneuronal tumors or glioneurocytic tumors), which have both glial and neuronal components, and are extremely varied, based in part on what types of glial and what types of neuronal components are present. These include Papillary Glioneuronal Tumor (PGNT), a range of Supratentorial gangliogliomas, assorted intramedullary spinal cord gangliogliomas, Pineal ganglioglioma, Hypothalamic ganglioglioma, cerebellar ganglioglioma, Ganglioglioma of the right optic tract, rosetted glioneuronal tumor ("glioneurocytic tumor with neuropil rosettes"), composite pleomorphic

xanthoastrocytoma (PXA)-ganglioglioma, desmoplastic ganglioglioma (both infantile (DIG) and non- infantile), Angioganglioglioma, and others. There are also some Glial tumors which do not comfortably fit into these five categories, notably Astroblastoma, Gliomatosis cerebri, and chordoid glioma, which is found solely in the Hypothalamus and Anterior Third Ventricle. Other neuroepithelial tumors include astrocytic tumors (e.g. astrocytomas) oligodendroglial tumors, Ependymal cell tumors (e.g. myxopapillary ependymoma), mixed gliomas (e.g. mixed oligoastrocytoma and ependymo-astrocytomas) tumors of the choroid plexus(Choroid plexus papilloma, Choroid plexus carcinoma), assorted neuronal and Neuroblastic tumors (e.g. gangliocytoma, central neurocytoma, dysembryoplastic neuroepithelial tumor, esthesioneuroblastoma, Olfactory neuroblastoma, Olfactory neuroepithelioma, and Neuroblastomas of the adrenal gland), pineal parenchyma tumors (e.g. pineocytoma, pineoblastoma, and Pineal parenchymal tumor of intermediate differentiation), embryonal tumors (e.g. medulloepithelioma, neuroblastoma, retinoblastoma, ependymoblastoma, Atypical teratoid/rhabdoid tumor, Desmoplastic medulloblastoma, Large cell medulloblastoma, Medullomyoblastoma, and Melanotic medulloblastoma) and others such as polar spongioblastoma and Gliomatosis cerebri. A second Division is tumors of the meninges. This includes tumors of the meningothelial cells, including Meningiomas (Meningothelial, Fibrous (fibroblastic), Transitional (mixed), Psammomatous, Angiomatous, Microcystic, Secretory, Lymphoplasmacyte-rich, Metaplastic, Clear cell, Chordoid, Atypical, Papillary, Rhabdoid, Anaplastic meningioma) and the non- Meningioma tumors of the meningothelial cells (Malignant fibrous histiocytoma, Leiomyoma, Leiomyosarcoma, Rhabdomyoma, Rhabdomyosarcoma, Chondroma, Chondrosarcoma, Osteoma, Osteosarcoma, Osteochondroma, Haemangioma,

Epithelioid haemangioendothelioma, Haemangiopericytoma, Angiosarcoma, Kaposi sarcoma). There are also Mesenchymal, non-meningothelial tumors (Lipomas, Angiolipoma, Hibernoma Liposarcoma, (intracranial)Solitary fibrous tumor, and Fibrosarcoma) as well as Primary melanocytic lesions (Diffuse melanocytosis, Melanocytoma, Malignant melanoma, and Meningeal melanomatosis). A third Division are the tumors of Cranial and Spinal Nerves. This includes Cellular schwannomas, Plexiform schwannomas and the Melanotic schwannomas (e.g. psammomatous melanotic schwannoma , Neuro-axial melanotic schwannoma, Dorsal dumb-bell melanotic schwannoma). There is also neurofibroma, Perineurioma (Intraneural and Soft tissue) and malignant peripheral nerve sheath tumor (MPNST), including Epithelioid, MPNST with divergent mesenchymal differentiation, and MPNST with epithelial differentiation. A fourth division are Germ Cell Tumors, including germinoma, embryonal carcinoma, yolk sac tumor, choriocarcinoma, and teratoma (Mature teratoma, Immature teratoma, and Teratoma with malignant transformation). A fifth division are the tumors of the Sellar Region, viz. pituitary adenoma, pituitary carcinoma, granular cell myoblastoma and craniopharyngiomas (Adamantinomatous and Papillary). Yet another division are local extensions from regional tumors, including paraganglioma, chodroma, chordoma, and chondrosarcoma. There are also Primitive Neuroectodermal Tumors (PNETs) including Medulloblastomas, medulloepitheliomas, ependymoblastomas and polar spongioblastomas. There are Vascular brain Tumors e.g. the hemangioblastomas, there is CNS Lymphoma (which can be primary or secondary) and Meningeal Carcinomatosis. There are Lymphoma AND Haemopoietic neoplasms including Malignant lymphomas (which can be primary or secondary), Plasmacytoma, and Granulocytic sarcoma. And there are many, many others.

B. Leukemia is any malignant neoplasm of the blood-forming tissues. Leukemia can arise from many different sources. These includes viruses such as EBV, which causes Burkitt's lymphoma, and HTLV-1, linked to certain T cell leukemias. Others are linked to genetic disorders, such as Fanconi's anemia, which is a familial disorder, and Down's Syndrome. Other leukemias are caused by exposure to carcinogens such as benzene, and some are actually caused by treatment with other neoplastic agents. Still other leukemias arise from ionizing radiation, and many are idiopathic. Leukemias also differ greatly in the morphology, degree of differentiation, body location (e.g. bone marrow, lymphoid organs, etc.) There are dozens of leukemias. There are B-Cell Neoplasms such as B-cell prolymphocytic leukemia and Hairy cell leukemia (HCL, a chronic Lymphoid leukemia). There are T-Cell Neoplasms such as T-cell prolymphocytic leukemia, aggressive NK cell leukemia, adult T cell leukemia/lymphoma (ATLL), and T-cell granular Lymphocytic leukemia. There are different kinds of acute myeloid leukemias (undifferentiated AML, acute myeloblastic, acute myelomonocytic leukemia, acute monocytic leukemias, acute monoblastic, acute megakaryoblastic (AmegL), acute promyelocytic leukemia (APL), and erythroleukemia). There is also lymphoblastic leukemia, hypocellular acute myeloid leukemia, Ph-/BCR- myeloid leukemia, and acute basophilic leukemia. Chromic leukemias include chronic lymphocytic leukemia(CLL, which exists in a B-cell and a T-cell type), prolymphocytic leukemia(PLL), large granular lymphocytic leukemia (LGLL, which goes under several other names as well), chronic myelogenous leukemia(CML), chronic myelomonocytic leukemia (CMML), chronic neutrophilic leukemia, chronic eosinophilic leukemia(CEL), and many others.

C. Carcinomas of the Liver include Hepatocellular carcinoma, Combined hepatocellular cholangiocarcinoma, Cholangiocarcinoma (intrahepatic), Bile duct cystadenocarcinoma and Undifferentiated carcinoma of the liver. There are also two types of liver hemangioma: cavernous and hemangioendothelioma.

D. The main types of lung and pleural cancer are small cell (i.e. oat cell, including combined oat cell), adenocarcinoma (Bronchioloalveolar carcinomas (Nonmucinous, Mucinous, and Mixed mucinous and nonmucinous or indeterminate cell type), Acinar, Papillary carcinoma, Solid adenocarcinoma with mucin, Adenocarcinoma with mixed subtypes, Well-differentiated fetal adenocarcinoma, Mucinous (colloid) adenocarcinoma, Mucinous cystadenocarcinoma, Signet ring adenocarcinoma, and Clear cell adenocarcinoma), squamous cell (Papillary, Clear cell, Small cell and Basaloid), mesothelioma (including epithelioid, sarcomatoid, desmoplastic and biphasic) and Large Cell Carcinoma (which include Large-cell neuroendocrine carcinoma, Combined large-cell neuroendocrine carcinoma, Basaloid carcinoma, Clear cell carcinoma Lymphoepithelioma-like carcinoma, and Large-cell carcinoma with rhabdoid phenotype). In addition there are also the carcinomas with pleomorphic, sarcomatoid or sarcomatous elements, including Carcinomas with spindle and/or giant cells, Spindle cell carcinoma, Carcinosarcoma and Pulmonary blastoma. The non-small cell lung carcinomas also include Adenosquamous carcinoma, the Carcinoid tumor (both typical Carcinoid and atypical Carcinoid) as well as carcinomas of salivary-gland type, including mucoepidermoid carcinoma and adenoid cystic carcinoma. There are some soft tissue tumors including localized fibrous tumor (formerly called benign fibrous mesothelioma); epithelioid haemangioendothelioma; pleuropulmonary blastoma; chondroma; calcifying fibrous pseudotumor of the visceral pleura); congenital peribronchial

myofibroblastic tumors, diffuse pulmonary lymphangiomyomatosis and desmoplastic round cell tumor. There are assorted bronchial adenomas (eg, adenoid cystic carcinomas, mucoepidermoid carcinomas, mucous gland adenomas, and oncocytomatous bronchial mucous gland adenoma) as well as other adenomas, including papillary adenoma. There are some papillomas, including squamous cell papilloma and glandular papilloma. There is also malignant melanoma of the lung, Hamartoma, cylindroma (cylindroadenoma), some germ cell tumors, thymoma and sclerosing haemangioma and many others as well.

E. Thyroid cancer comes in four forms: papillary thyroid cancer, follicular thyroid cancer, anaplastic thyroid cancer, and medullary thyroid cancer.

F. Carcinomas of the skin are the Basal cell carcinomas (BCC), including Superficial BCC, Nodular BCC (solid, adenoid cystic), Infiltrating BCC, Sclerosing BCC (desmoplastic, morpheic) , Fibroepithelial BCC, BCC with adnexal differentiation, Follicular BCC, Eccrine BCC, Basosquamous carcinoma, Keratotic BCC, Pigmented BCC, BCC in basal cell nevus syndrome, Micronodular BCC. Another important family is the Squamous cell carcinomas (SCC) which include Spindle cell (sarcomatoid) SCC, Acantholytic SCC, Verrucous SCC, SCC with horn formation, and Lymphoepithelial SCC, along with less well classified SCCs such as Papillary SCC, Clear cell SCC, Small cell SCC, Posttraumatic (e.g., Marjolin ulcer) and Metaplastic (carcinosarcomatous) SCC. Another family is the Eccrine carcinomas including Sclerosing sweat duct carcinoma (syringomatous carcinoma, microcystic adnexal carcinoma), Malignant mixed tumor of the skin (malignant chondroid syringoma), Porocarcinoma, Malignant nodular hidradenoma, Malignant eccrine spiradenoma, Mucinous eccrine carcinoma, Adenoid cystic eccrine carcinoma, and Aggressive digital papillary adenoma/adenocarcinoma. Other carcinomas of the skin include Epidermal

carcinomas, Paget disease, Mammary Paget disease, Extramammary Paget disease Adnexal carcinomas, Apocrine carcinoma, Sebaceous carcinoma, Tricholemmocarcinoma and Malignant pilomatricoma (matrical carcinoma).

G. There are many types of colon cancers, and this category is rather diverse. Most are adenocarcinomas, either of the mucinous (colloid) type or the signet ring type. Less common colon cancers include squamous cell, neuroendocrine carcinomas, carcinomas of the scirrhous type, lymphomas, melanomas (which can be primary or metastatic), sarcomas (including fibrosarcomas and Leiomyosarcomas), and Carcinoid tumors.

H. Renal carcinomas include papillary renal cell carcinoma, conventional-type (clear cell) renal carcinoma, chromophobe renal carcinoma, collecting duct carcinoma, and some unclassified cancinomas. Other kidney cancers include Transitional Cell Carcinoma, Wilms Tumors, and Renal Sarcomas.

I. Carcinomas of the prostate are usually adenocarcinomas, but others include small cell carcinoma, mucinous carcinoma, prostatic ductal carcinoma, squamous cell carcinoma of the prostate, basal cell carcinoma, neuro-endocrine carcinoma, signet-ring cell carcinomas and others.

J. Penile carcinoma is usually a squamous cell carcinoma, but there is also Penile clear cell carcinoma and Sarcomatoid carcinoma.

K. The carcinomas of the extrahepatic bile ducts are of numerous types, including carcinoma in situ, Adenocarcinoma, Papillary adenocarcinoma, Adenocarcinoma (intestinal-type), Mucinous adenocarcinoma, Clear cell adenocarcinoma, Signet ring cell carcinoma, Adenosquamous carcinoma, Squamous cell carcinoma, Small cell carcinoma (oat cell carcinoma) and undifferentiated carcinoma of the extrahepatic bile ducts.

L. Breast cancers come in great variety. The most important category of breast cancers is the ductal cancers. These come in a wide variety of types. Presently, these are divided into the following categories: Intraductal (in situ); Invasive with predominant intraductal component; Invasive, NOS; Comedo; Inflammatory (IBC); Medullary with lymphocytic infiltrate; Mucinous Carcinoma (colloid carcinoma); Papillary carcinoma; Scirrhous; Tubular; and Other. Another category is the Lobular breast cancers, which can be in situ, Invasive with predominant in situ component, and Invasive. There is Paget's disease of the Nipple, which can be also with intraductal carcinoma or with invasive ductal carcinoma. There is Adenomyoepithelioma , a dimorphic tumor characterized by the presence of both epithelial and myoepithelial cells. There is breast angiolipoma and spindle cell lipoma of the breast. There is lymphoma of the breast (which exists in both Non-Hodgkin's lymphoma of the breast and Hodgkin's disease of the breast forms). There are some sarcomas, including giant cell sarcoma of the breast, leiomyosarcoma of the breast, Angiosarcoma of the breast, cystosarcoma phylloides, and liposarcoma of the breast. There are carcinoid tumors which can be primary carcinoid tumors of the breast, or can arise from from nonmammary sources. There are breast salivary gland-like tumors, including acinic cell carcinoma (AcCC), oncocytic carcinoma (Mammary epithelial oncocytoma), and mucoepidermoid carcinoma (MEC). Other rare carcinomas include Spindle cell carcinoma of the breast (SpCC), Squamous cell carcinoma of the breast, Secretory Carcinoma of the Breast (Juvenile secretory carcinoma), Metaplastic carcinoma of the breast (a heterogeneous group of invasive breast cancers including types with squamous differentiation and those with heterologous elements), Invasive Micropapillary Carcinoma of the Breast, Adenoid cystic carcinoma of the breast, cribriform carcinoma,

Myofibroblastoma of the Breast (Benign spindle stromal tumor of the breast) and glycogen-rich clear cell carcinoma of the breast. There are numerous other rare breast cancers, including for example Fibromatosis of the breast (extra-abdominal desmoid), Angiomatosis of the Breast, and mammary hamartoma. There are also nonmammary tumors, primarily adenocarcinomas, that can metastasize to the breast including bronchogenic carcinomas, malignant melanomas (primary and secondary), rhabdomyosarcomas, malignant mesotheliomas, thyroid carcinomas, renal cell carcinomas, malignant lymphomas, and gastrointestinal carcinomas (including those from the stomach, pancreas, esophagus, and colon).

M. Ovarian cancers are a heterogeneous group of tumors. The most important are the epithelial tumors. These are themselves fairly diverse, the categories being Serous cystomas (Serous benign cystadenomas, Serous cystadenomas with proliferating activity of the epithelial cells and nuclear abnormalities but with no infiltrative destructive growth and Serous cystadenocarcinomas); Mucinous cystomas (divided the same three ways); Clear cell tumors (mesonephroid tumors, again divided the same way), Endometrioid tumors (similar to adenocarcinomas in the endometrium: Endometrioid benign cysts, Endometrioid tumors with proliferating activity of the epithelial cells and Endometrioid adenocarcinomas), mixed mesodermal (now considered to be carcinomas with areas of sarcomatous differentiation), clear cell, transitional cell, and mixed epithelial. Second, there are the Granulosa-Stromal Cell Tumors. These include the Granulosa cell tumor (which exists in juvenile and adult forms) and the tumors in the thecoma-fibroma group. This includes thecoma-fibroma group typical thecoma and luteinized thecoma or "stromal Leydig cell tumor". This also includes fibroma, cellular fibroma, fibrosarcoma, stromal

tumor with minor sex cord elements, sclerosing stromal tumor, signet ring cell stromal tumor and others. Third, there are the Sertoli-Leydig Cell Tumors and Androblastomas. These include the Sertoli cell tumor (tubular androblastoma), Sertoli-Leydig cell tumor , a poorly differentiated sarcomatoid, tumor and a Retiform tumor. Fourth, there are some miscellaneous Sex Cord Stromal Tumors, including Gynandroblastoma of the ovary (composed of sex cord and stromal cells of both ovarian and testicular types), Sex Cord Tumor with Annular Tubules, Stromal luteoma, and Leydig cell tumor)which comes in hilus and non-hilar types). Fifth, there are an assortment of Germ Cell Tumors. These include Dysgerminoma; Yolk Sac Tumors (Endodermal Sinus Tumor, and Polyvesicular vitelline tumor, Hepatoid and others); Embryonal Carcinoma; Polyembryoma; Choriocarcinoma and a wide variety of Teratomas. These tetromas include immature, cystic (dermoid cyst), retiform (homunculus), and Monodermal, including struma ovarii, carcinoid (insular and trabecular), struma carcinoid, mucinous carcinoid, neuroectodermal tumors, sebaceous tumors and others. Finally, there are an assortment of other tumors which do not fit into the above categories. There is Gonadoblastoma and Tumors of Rete Ovarii (which c an be Adenomatoid tumor or a Mesothelioma). There are some tumors of Uncertain Origin, including Small cell carcinoma, tumors of probable Wolffian origin, a Hepatoid carcinoma and Oncocytoma. There are some Soft Tissue Tumors not Specific to Ovary, and there are assorted malignant Lymphomas and Leukemias which land up in the ovaries.

N. Cervical cancers. There are many different categories and sub-categories of cervical cancers. The majority of cervical cancers are Squamous Cell Carcinomas. These come in numerous types: large cell nonkeratinizing type; large cell keratinizing type; Basaloid;

Verrucous; Warty; Papillary; Lymphoepithelioma-like; and Squamotransitional, Early invasive (microinvasive) squamous cell carcinoma; Squamous intraepithelial neoplasia (including Cervical intraepithelial neoplasia and Squamous cell carcinoma in situ). There are also a variety of Adenocarcinomas, the most important of which are the Mucinous adenocarcinoma, which include the Endocervical, Intestinal, signet-ring cell, minimal deviation, and Villoglandular. There is also Endometrioid adenocarcinoma, clear cell adenocarcinoma, serous adenocarcinoma, Mesonephric adenocarcinoma, Early invasive adenocarcinoma, and Adenocarcinoma in situ. In addition, there are neuroendocrine carcinomas, divided into Small Cell, large cell, classical carcinoid and atypical carcinoid. Other epithelial tumors include Adenosquamous carcinoma, mixed Adenosquamous Carcinomas, which can be either well-differentiated or poorly differentiated, the latter including glassy cell carcinoma, adenoid cystic carcinoma, adenoid basal carcinoma and Undifferentiated carcinoma. There are also some mixed carcinoma with signet-ring cells, and other types of other poorly differentiated mixed carcinomas. This group includes tumors sometimes called apudomas or argyrophil cell carcinomas. There are also an assortment of Mesenchymal tumors of the cervix, including Leiomyosarcoma; Endometrioid stromal sarcoma, low grade; Undifferentiated endocervical sarcoma; Sarcoma botryoides; Alveolar soft part sarcoma, Angiosarcoma of the cervix, Malignant peripheral nerve sheath tumor of the cervix; Cervical leiomyoma; and Rhabdomyoma of the cervix. There are also some mixed epithelial and mesenchymal tumors, including Carcinosarcoma (malignant müllerian mixed tumor), Adenosarcoma, Wilms tumor, typical and atypical Polypoid Adenomyoma, and Papillary adenofibroma of the cervix. There are also Melanocytic tumors, including primary malignant melanoma of the cervix and Blue naevus of the

cervix. There are also germ cell type tumors, including Yolk sac tumor, Dermoid cyst, and Mature cystic teratoma of the cervix. There is also primary choriocarcinoma of the cervix, which does not fit well into any category. There are also cancers secondary to the cervix, which have spread from elsewhere.

O. Bladder cancers. Most cases of bladder cancers are transitional cell (urothelial) carcinoma, which includes non-invasive papillary urothelial carcinoma, Flat urothelial carcinoma in situ (CIS), Superficially invasive urothelial carcinoma, and muscle invasive tumors. Adenocarcinomas of the bladder include Primary Adenocarcinoma (urachal and non-urachal), Prostatic adenocarcinoma, Gastro-intestinal adenocarcinomas and Clear cell carcinoma. Squamous cell carcinomas include Verrucous carcinomas, and a secondary squamous cell carcinoma of the bladder, from the cervix. Small cell carcinomas include Primary small cell carcinoma of the bladder and the secondary small cell carcinoma ('reserve cell carcinoma') of the lung. Lymphomas include the primary lymphomas (Low grade B-cell lymphoma of MALT type, High grade B-cell lymphoma, and T-cell lymphoma), as well as secondary lymphomas, including mantle cell lymphomas. Melanomas include Primary Malignant melanoma of the bladder, and secondary ones. The sarcomas of the Bladder are Leiomyosarcoma, Osteosarcoma and Rhabdomyosarcoma. There is also a primary primitive neuroectodermal tumour (PNET) of the bladder, Paraganglioma (which can metastasize), Nephrogenic adenoma, Metastatic renal cell carcinoma of the bladder, and both primary and secondary (from the uterus) Choriocarcinoma of the bladder.

P. Cancers of the Vulva are mostly Squamous carcinoma, but these also include Melanoma, Bartholin's Adenocarcinoma, Basal Cell carcinoma and some Sarcomas.

Q. Vaginal cancers are primarily Squamous Carcinoma, but some are

Adenocarcinoma, Melanoma of the vagina; Sarcoma of the vagina, Bowen's disease and Germ Cell Tumors.

R. The most important of the cancers of the uterus are the Endometrial Carcinomas. The great majority of these are Endometrioid; others include Uterine Papillary Serous Tumor (UPST), Clear Cell Carcinoma, Mucinous and Squamous. Uterine Sarcomas include Smooth Muscle Tumors include leiomyoblastoma, clear cell leiomyoma, epithelioid leiomyoma, plexiform tumorlet, Intravenous leiomyomatosis, Benign metastasizing leiomyoma, Leiomyomatosis peritonealis disseminate and Leiomyosarcoma (LMS). Endometrial Tumors include Endometrial stromal nodule, Endolymphatic stromal myosis, (ESM) and Endometrial stromal sarcoma (ESS). There are the mixed tumors Müllerian adenosarcoma and Malignant mixed mesodermal tumors (MMMT). Other sarcomas are Rhabdosarcoma, Osteosarcoma, Chondrosarcoma nad Hemangiopericytoma. There are also uterine cancers which do not come from uterine cells themselves, but start in the tissue that begins to develop immediately after conception: Persistent gestational trophoblastic disease, choriocarcinoma and placental site trophoblastic tumors (PSTT).

S. There are several main types of stomach cancers, which are very different from each other. (1) Lymphomas of the stomach are cancers of the immune system tissue that are found in the wall of the stomach. These come in two main categories. One is the Non-Hodgkin's lymphomas of the stomach, including MALT lymphoma, and assorted Large Cell Lymphoma of the Stomach such as anaplastic CD30 (Ki-1) positive large cell lymphoma (ALCL). The other is Hodgkin Lymphoma in the Stomach. These include both lymphomas which are primary to the stomach, and nodal lymphomas that have spread to the stomach from e.g. the spleen or liver and are thus secondary. There are Tertiary gastric lymphomas

as well. (2) Gastric stromal tumors (GISTs) develop from the tissue of the stomach wall. There are an assortments of these; GISTs vary from cellular spindle cell tumors to epithelioid and pleomorphic ones. (3) Carcinoid tumors are tumors of hormone-producing cells of the stomach. These are classified into are classified into those that are associated with hypergastrinemic states (type 1, atrophic gastritis, pernicious anemia); Zollinger-Ellison syndrome [ZES] tumors (type 2), and tumors without hypergastrinemia (type 3 or sporadic). (4) Carcinoma of the Stomach exists in five types: papillary, tubular, mucinous, signet-ring cell adenocarcinoma and undifferentiated carcinoma. (5) Soft tissue sarcomas, most notably leiomyosarcoma of the stomach. There are other tumors as well, including Gastric Lipoma, gastric xanthelasma, and benign reactive lymphoid hyperplasia (pseudolymphoma)

T. A hyperproliferative disorder, listed in e.g. in claims 3 and 12 , beyond cancers themselves, is anything that causes any abnormal tissue growth. That can be growth by cellular proliferation more rapidly than normal, or continued growth after the stimulus that initiated the new growth has ceased, or lack (partial or complete) of structural organization and/or coordination with surrounding tissue, all of which arise from lack of proper control of cell growth. It can be benign or malignant. Thus, such a term covers not only all cancers, but also covers precancerous conditions such as lumps, lesions, and polyps. In addition, it embraces various non-cancerous proliferative disorders such as certain types of restenosis, vascular smooth muscle proliferation associated with atherosclerosis, glomerular nephritis, pulmonary fibrosis, clonal proliferative disorders including the various Myelodysplastic Syndromes (the assorted Refractory Anemias, Ph-Chromosome-Negative Chronic Myelocytic Leukemia, Chronic Myelomonocytic Leukemia

and Agnogenic Myeloid Metaplasia) and the Myeloproliferative Disorders (Chronic myelogenous leukaemia, which exists in adult and juvenile forms; Polycythemia vera;. Agnogenic myeloid metaplasia and Essential thrombocythemia). It includes certain types of abnormal wound healings. It covers numerous types of abnormal angiogenisis e.g. in certain eye diseases (such as neovascular glaucoma, diabetic retinopathy, retinopathy of prematurity, (retrolental fibroplasias), and age-related and certain other types of macular degeneration), Rosacea, some neurodegenerations, respiratory distress in the premature infant, some problems in embryonic development, and atherosclerosis. It includes the myeloproliferative disorders (such as primary polycythemia, primary (essential) thrombocythemia, chronic myelogenous leukemia and myleofibrosis). Also included are numerous Plasma cell dyscrasias, such as Multiple myeloma, Smouldering Myeloma, monoclonal gammopathy of unknown significance (MGUS), solitary plasmacytoma of bone (SPB), asymptomatic myeloma, Waldenström's macroglobulinemia, Solitary extramedullary plasmacytoma, Primary Amyloidosis, POEMS syndrome, and the three heavy-chain diseases). It also includes an assortment of skin disorders, such as psoriasis, atopic dermatitis, allergic contact dermatitis, epidermolytic hyperkeratosis, palmoplantar Pustulosis, lichenified eczema, seborrhoeic dermatitis and the keratinization disorders (including assorted ichthyoses, keratosis pilaris, keratosis follicularis, tylosis, "knuckle pads", corns, assorted callosities, and numerous keratinization disorders found in dogs and cats). Also included are LAM (Lymphangioleiomyomatosis, a smooth muscle proliferative disorder of the lungs) rheumatoid arthritis and even Alzheimer's Disease. It covers most inflammatory and autoimmune disorders. Indeed, almost anything that the body grows ---

skin, blood cells, nerves, plasma, muscles, the vascular network, can grow too fast, or in a manner too undifferentiated.

U. Restenosis, or recurrent stenosis, listed in claim 13, is an extremely general term. Stenosis is the narrowing of any canal, orifice, valve, duct, tube (such as trachea), opening, etc. in the body. These can arise from obstructive lesions, deposits of granulations, organ hypertrophy, etc. There is no such thing as being able to treat such widely diverse problems which arise from different and unrelated sources.

The earlier traverse focused on the "renarrowing of a coronary artery after angioplasty or stenting". The claim is not so limited. Narrowing can occur from deposits (of any sort) and do not necessarily have anything to do with uncontrolled cell growth, or angiogenesis. Of course, applicants have not shown that their compounds can control angiogenesis.

V. Prevention of apoptosis. There is no "master switch" for apoptosis. Indeed, there are 3 independent mechanisms by which a cell commits suicide by apoptosis.

1.In the intrinsic (or mitochondrial) pathway, apoptosis is triggered by internal signals. The protein Bcl-2 , by a poorly understood mechanism, reacts to

Internal damage to the cell, and activates a related protein, Bax, which perforates in the outer mitochondrial membrane, causing cytochrome c to leak out.

The released cytochrome c binds to the protein Apaf-1 , which, using ATP,

aggregates to form apoptosomes. The apoptosomes bind to and activate caspase-9. Caspase-9 cleaves and thereby activates other caspases, notably caspase-3 and -7. These in turn create an expanding cascade of proteolytic activity resulting in digestion of structural

proteins in the cytoplasm, degradation of chromosomal DNA, and ultimately phagocytosis of the cell.

2. In the extrinsic or death receptor pathway, apoptosis is triggered by external signals: By an assortment of mechanisms, not all of which are understood, external sources, e.g. cytotoxic T cells, trigger the production of the death activators FasL and a-TNF respectively. These transmits a signal to the cytoplasm that leads to activation of caspase 8, which then initiates a cascade of capsase activation leading to phagocytosis of the cell.

3. A Third pathway does not involve capsases at all. When the cell receives a signal (the full nature of these signals not being understood), the protein AIF is released from the intermembrane space of mitochondria and it migrates into the nucleus. There it binds to DNA, which triggers the destruction of the DNA and cell death. This pathway exists in neurons, but it is not clear what other cells it may also exist in.

The above is an extremely simplified picture; for example processes of signal amplification, exactly how and what capsase 8 activates, the role of p53 activating Bcl-2 and Bax, the roles of the PIG1-PIG13 genes in the process, and the function played by JNK activation are all complex matters. It appears that factors such as eIF4E, splicing factors such as SMN, FAIM, TLE1, AAC-11, fortilin (TPT1), prothymosin-alpha, eIF4E, gelsolin, and DFF tend to inhibit apoptosis, and factors such as the ALG family (e.g. ALG2, ALG3, STM-2), the NADE family (e.g. NADE, BEX, NGFRAP1), CIDE-3, Smac DIABLO, DAXX, CAD, IGFBP-3, STAG1, FLJ21908, TSAP6, HtrA2, PSAP, glycodelin A(PP14), SPARC, NRAGE, and IGFBP-3 promote apoptosis, and there are still others whose role is unclear. There are in fact dozens of biological entities that have been identified as apoptosis factors,

and more are discovered each year. In most cases, little is known how these operate and are regulated, which makes the apoptosis system as a whole substantially unpredictable.
W. Claim 21 is drawn to protecting neuronal cells from antineoplastic agents. This is an odd utility, since these compounds are themselves asserted to be antineoplastic agents. Thus these compounds are asserted to protect nerve cells (of which there are many different types) from these very compounds, which makes no sense at all.

The earlier traverse on this issue was unpersuasive. Applicants asserted, without evidence that "One of ordinary skill in the art ...would have no difficulty understanding in which situations to beneficially apply the present invention." How will this be done? Applicants have simply not addressed the central paradox that these compounds are supposed to protects cells from, in essence, themselves. Just assaying that the compounds "arrest mitotic cell division" doesn't address the point.

Applicants earlier stated, "The size of a list the Examiner chooses to put together is no indication of a requirement of a requirement for undue experimentation." This is mistaken. As was noted above, the scope of the claims is one of the factors that must be taken into account when determining whether undue experimentation will be required to enable the claims. The broader the claim, the more that is entailed. This is because there is more that must be enabled. As was stated in In re Wright, 27 USPQ2d 1510, 1513 , "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation'." The larger that this "full scope" is, the more there is which needs to be enabled.

Applicants now state, "The Examiner provided a long list of diseases, yet no evidence or even allegation is presented that these disease do not involve hyperproliferation

and cell cycling." This criticism makes no sense. Of course, these ALL involve hyperproliferation and cell cycling. The purpose of this section is to set forth the breadth of the claims, to set forth what the claims cover. The claims cover hyperproliferative disorders, the most important of which are cancers. Thus, in section A-S, the hyperproliferative disorders which are cancers are set forth, and in section T, the hyperproliferative disorders which are not cancers are set forth. As for cell cycling, it is involved, not only in hyperproliferative disorders, but in most normal cellular processes as well. Cell cycling is an essential component of how all human cells do their jobs.

Finally, it must be noted that "treatment" in this case includes prevention (prophylaxis) . The specification refers to "prophylactic treatment of a patient at risk of developing a hyperproliferative disease, such as a neoplastic or non-neoplastic, disease comprising administering a prophylactically effective antineoplastic amount of a compound of the formula. A patient at risk of developing a neoplastic disease refers to a patient who ... has ... risk factors associated with the development of neoplastic disease states." It should be noted that the vast majority of adults have at least one risk factor (which the specification gives as examples "genetic predisposition to neoplasms, had or currently have neoplasms, exposure of carcinogenic agents, diet, age") for cancer. Thus, the claims embrace the prevention of cancer and other hyperproliferative disorders.

Earlier, applicants had said, "administration can be accomplished without undue experimentation." Yes, the administration of any drug for any disease can be done without undue experimentation; one of ordinary skill in the art know how to administer a medicinal, but the claims call for the treatment of the disease, and not just the

administration of a medicine. Applicants had also made a vague reference to the Sherr and Roberts (1999) publication. It is not clear precisely what this has to do with scope of diseases. The reference, in fact, does not directly discuss the use of pharmaceuticals to treat disease. The reference does have a heavy emphasis on the Kip/Cip family of proteins. These are listed briefly in the background part of the specification, but there is no specific mention that the claimed compounds inhibit members of this family.

Applicants on page 15 state, "Applicants do not agree, length of a list does not matter. Merely being able to name embodiments and sub-embodiments and include more or less lengthy descriptions in not determinative of scope. Scope of this aspect of the invention is rather concise, hyperproliferative diseases. All the members of the list, according to the Examiner involve hyperproliferation. Compounds of the present invention are shown to inhibit hyperproliferation...." This is not agreed with. As an aside, the apoptosis claims do not necessarily involve hyperproliferative disorders. Beyond that, the term "hyperproliferative diseases" is an extremely broad category which covers such largely unrelated disorders as rheumatoid arthritis, Type-1 diabetes, asthma, arteriosclerosis, restenosis, cancers of all types, Multiple myeloma, psoriasis, LAM and Rosacea. Hyperproliferation occurs by a bewildering variety of mechanisms, which is, in part, what there is such an extreme diversity in these diseases. Applicants have certainly not shown that their compounds can inhibit hyperproliferation generally. The assumption that inhibiting CDK1 CDK2 and/or CDK4 will suppress hyperproliferation generally is without any scientific basis.

(2) The nature of the invention and predictability in the art: With specific reference to cancer, ***Ex parte Kranz***, 19 USPQ2d 1216, 1219 notes the "general unpredictability of the field [of] ...anti-cancer treatment." More generally, the invention is directed toward medicine and is therefore physiological in nature. It is well established that "the scope of enablement varies inversely with the degree of unpredictability of the factors involved," and physiological activity is generally considered to be an unpredictable factor. See ***In re Fisher***, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970).

The earlier traverse was unpersuasive. ***In re Fisher*** is not considered to be "outdated caselaw". It is cited in MPEP 2164.03; and was cited in In re Wright, 27 USPQ2d 1510 (Fed. Cir. 1993), ***Ex parte Primakoff,*** 64 USPQ2d 1848 and ***Ex parte Varshavsky***, 63 USPQ2d 1486 (2001). The fact that the CCPA was "dismantled" is of no legal significance; its successor Court adopted its decisions as precedent.

Applicants in the present traverse say of Fisher, "the reference to unpredictability can only be seen as dicta." This is not agreed with The fact that such language has been repeatedly cited in other cases, and in the MPEP, indicates that it is not treated as dicta.

In response to the ***Kranz*** decision, which is dated 1990, applicants says, "The Examiner refuses to recognize significant progress in the field since President Nixon declared war on cancer and started massive funding increases. This funded research has born fruit." If applicants wish to assert that the "general unpredictability of the field [of] ...anti-cancer treatment" has been reversed since then, they are invited to present references to that effect.

(3) Direction or Guidance: That provided is very limited. The dosage range information provided on page 44 is a range of 0.02-1 mg/kg/day, but this dosage range is of little value because it is completely generic. That is, it is the same dosage for all disorders listed in the specification, from asthma to type-1 diabetes to restenosis to cancer , which is a very substantial range of disorders. In terms of specific disorders, there are vast pages of disorders listed, especially on pages 7-15 and 21-22. Applicants reply that "dosage determination is very routine". This is not true in certain areas, and cancer is certainly one of them. Many promising anti-cancer drugs have foundered because of an inability to find a dosage regimen that actually works.

In response, applicants earlier argued, "Further, the citation of experimentation of drugs that foundered is evidence that such experimentation is in fact routine, not undue." This is illogical. As the examiner pointed out, many promising anti-cancer drugs have foundered because those of one skilled in the art were unable to find a dosage that actually works. This indicates that it is not a matter of routine experimentation to go from promising in vitro (or animal) experiments to human success. The dosage in the specification, which is the same regardless of whether one is speaking of asthma or cancer, is thus of no real value because it is completely generic.

Applicants subsequently argued that "Applicants believe that the anti-cancer drags, in question may have foundered in the Food and Drug approval process because of a narrow balance between safety and efficacy." Safety is not directly the issue here. The question is the known difficulty of finding a dosage or dosage regimen for anti-cancer drugs which is actually effective. Therefore, there is a greater need of guidance in the realm of dosage for anti-cancer drugs than for e.g. drugs for bacterial infections. Therefore, the fact that the

same dosage is given for a huge variety of largely unrelated disorders, from cancer to Alzheimer's Disease to asthma, means that it is of little value.

Applicants now argue, "Applicants respectfully submit that a generic range is proper in view of the narrow target range of the compounds." As indicated, there is not only a wide range of compounds, but, more to the point, an extremely wide range of disorders. To give one dosage range which covers things as diverse as asthma, type-1 diabetes, sarcoma, restenosis and the inhibition of apoptosis, is to provide little or no effective guidance. Applicants continue, "Depending on the degree of inhibition dosage can be titrated with only routine, not undue experimentation." The examiner is not aware of any method for determining a dosage for the treatment of e.g. asthma, type-1 diabetes, sarcoma, and restenosis on the basis of CDK inhibition data. If applicants are awre of such a method, then are invited to present a reference to that effect.

(4) State of the Prior Art: The claimed compounds are piperidinyl-amino purines, with a particular substitution pattern at several positions. So far as the examiner is aware, piperidinyl-amino purines have not been successfully used as anticancer agents or for any other utility listed in the specification.

Applicants argued previously that "merely because similar compounds may not have successfully achieved any arbitrary task....." this is not an "arbitrary task" that the examiner refers to; it is the specific utility claimed. The fact that such compounds have not been successfully used means that applicants cannot "piggy-back" on the success of those compounds, e.g. in terms of the dosages or medical regimen. Therefore, more experimentation would be needed than in a case where similar compounds were already

established to work. In this regard, applicants cited the Knockaert reference, but it is difficult to see how this reference can be evidence of enablement. A simple listing of "The potential applications of cyclin dependent kinase (CDK) inhibitors" as appears in the Figure 3 that applicants point to is hardly the same thing as establishing enablement, especially since none of the compounds mentioned in the reference had been established as actually being effective for the treatment of a disease. Indeed, the concluding remarks state ""However, their cellular targets remain to be identified", which is certainly evidence of low skill in this art. Further, and very importantly, it is clear that applicants compounds are quite atypical. The paper says in its concluding remarks, "Most CDK inhibitors have antiproliferative properties associated with apoptosis inducing activity and display anti-tumoural activity." However, applicants compounds have the opposite property. These compounds are said to prevent apoptosis (see claim 15). Therefore, since in those compounds, the "antiproliferative properties" are "associated with apoptosis inducing activity", and since applicants compounds have the opposite property, one cannot rely on any of this knowledge at all, and to the extent that one could rely, the paper is an argument against enablement, since it teaches that the antiproliferative properties arise from inducing apoptosis, and applicants compounds prevent apoptosis generally.

In responding to this "However, their cellular targets remain to be identified" text in the Knockaert reference, applicants now state the following: "The Examiner cited Knockaert for its mention that cellular targets at that time were yet to be identified. Cellular targets of what? Compounds shown to be potent inhibitors of CDKs!" This answer is confused. The target what "remain to be identified" are not compounds, but the actual places in the cell where these compounds are alleged to have their mode of action. This sentence does not

have, to quote applicants, "unknown meaning", and is not taken out of context. At any rate, a list of potential application is just that. Potential. If the applications are potential, they appear not to have been achieved, which is evidence of lack of enablement. Moreove, applicants have not dealt at all with the fact that the reference notes that the reference sates, ""Most CDK inhibitors have antiproliferative properties associated with apoptosis inducing activity", and applicants have the opposite effect.

Applicants also earlier argued: "Someone has to pioneer a field. The present Applicants have made pioneering contributions to this art recognizing benefits of inhibiting cyclin dependent kinases and providing novel compounds that inhibit them.. While perhaps Applicants cannot piggy-back on past successes of others..." Applicants may well have a pioneering invention. But an inability to piggy-back on past successes of others means that there is more work to be done here, as one cannot rely on the work done by other with similar structure and having similar pharmacological effects. This thus weighs in toward there being more experimentation needed.

Applicants now state, "At part (4) the Examiner again seems to be implying that new discoveries or inventions if not obvious are not enabled." That is not the case. First, this is just one factor in determining enablement. No one factor by itself answers the question (if it did, there would be no need for all the factors). But the lack of other compounds of similar structure increases the unpredictability of the area. As was stated in ***Ex parte Sudilovsky***, 21 USPQ2d 1702: "Appellant's invention concerns pharmaceutical activity. Because there is no evidence of record of analogous activity for similar compounds, the art is relatively unpredictable."

Applicants state, "Applicants do not have to piggyback on other compounds to prove the effect of the present compounds." That is correct; applicants do not have to, but the lack of structurally similar compounds means that this piggybacking mechanism is not available.

(5) Working Examples: There are no working examples to the treatment of any actual disease. Table 2 shows inhibition of three CDKs, which cannot be said to be representative of the class as a whole. Table 3 lists test results in 3-5 cell lines, and example 4 gives results in xenografts on two cell lines, one an acute leukemia, and one for a prostate cancer. No testing for e.g. asthma or restenosis appears.

The traverse is unpersuasive. Applicants earlier stated, "However, disease models are effectively inhibited from cell culture experiments." The examiner does not understand this sentence. What does it means that a disease model is inhibited?

Applicants also earlier stated, "Claims specify three CDKs. Inhibition of these is demonstrated in the application to effect inhibition of cyclin dependent kinases... The Examiner has provided not rationale, why such should not be the case." This appears to be referring to claims 22-23, but these claims are not under rejection.
In this regard, the most recent response states, "Applicants question whether this rejection applies to claims 22, 23 and 49. Indication one way or the other may reduce issues is appeal proves necessary." The examiner states once again that claims 22 and 23 are not under rejection.

As for claim 49, that is drawn to CML. Claim 49 is rejected. CML is a cancer which has been very resistant to chemotherapy, with bone marrow transplants or stem cell

transplantations having the best results. Now, the only good chemotherapy comes from Gleevec, which blocks the Philadelphia chromosome, a mode of action these compounds are not disclosed to have. If applicants show that these compounds, as a class, have such a property, then claim 49 will be freed from this rejections. Alternatively, any other test, which has been established as a reliable predictor for CML efficacy, can be used.

Applicants also earlier stated, "Methotrexate is a compound with a similar but not identical mechanism." This point is not agreed with at all. Methotrexate acts primarily as a folate antagonist; applicants' compounds are not disclosed to be folate antagonists. MTX is well known to induce apoptosis in e.g. activated T cells. Applicants compounds are said to suppress apoptosis. Applicants compounds act, by inhibiting three CDKs and their complexes. So far as the examiner is aware, MTX is not a CDK inhibitor. MTX has a cytotoxic mode of action; applicants compounds, so far as can be determined from the specification, do not operate via a cytotoxic mode of action. Thus, any notion that these compounds and MTX have a "similar" mechanism of action is without scientific basis.

(6) Skill of those in the art: The prior art knows that there never has been a compound capable of treating cancer generally. "The cancer therapy art remains highly unpredictable, and no example exists for efficacy of a single product against tumors generally." (<http://www.uspto.gov/web/offices/pac/dapp/1pecba.htm#7> ENABLEMENT DECISION TREE, Example F, situation 1) There are compounds that treat a modest range of cancers, but no one has ever been able to figure out how to get a compound to be effective against cancer generally, or even a majority of cancers. Thus, the existence of such a "silver bullet" is contrary to our present understanding in oncology. This is because it is now

understood that there is no "master switch" for cancers generally; cancers arise from a bewildering variety of differing mechanisms. Even the most broadly effective antitumor agents are only effective against a small fraction of the vast number of different cancers known. This is true in part because cancers arise from a wide variety of sources, such as viruses (an estimated at least 20% are of viral origin e.g. EBV, HHV-8, HTLV-1 and other retroviruses), exposure to chemicals such as tobacco tars, genetic disorders (e.g. Tuberous Sclerosis), ionizing radiation, and a wide variety of failures of the body's cell growth regulatory mechanisms. Different types of cancers affect different organs and have different methods of growth and harm to the body, and different vulnerabilities. Cancers that affect just a certain type of structure can be quite varied. Fibromas for example include Infantile myofibromatosis, Fibrous hamartoma of infancy. Juvenile hyaline fibromatoses. Infantile digital fibromatoses. Calcifying aponeurotic fibromas. Giant cell fibroblastoma. Ovarian fibroma, Dermatofibroma, myofibroma, myofibromatosis, desmoplastic fibroma, neurofibroma, peripheral odontogenic fibroma, peripheral ossifying fibroma, giant cell fibroma, Chondromyxoid Fibroma, Oral Neurofibroma, Juvenile aponeurotic fibroma (JAF), aggressive infantile fibromatosis (AIF), omental fibroma, Perifollicular fibroma, ameloblastic fibroma, Premalignant Fibroepithelial Tumor (Pinkus Tumor), Periungual fibroma (Koenen tumor), desmoid tumor, tracheal fibroma and many others. Since it is beyond the skill of oncologists today to get an agent to be effective against cancers generally, evidence that the level of skill in this art is low relative to the difficulty of such a task. The skill thus depends on the particular cancer involved. There are a few cancers where the skill level is high and there are multiple successful chemotherapeutic treatments. One skilled in the art knows that chemotherapy of brain tumors is especially

difficult. This is because 1) the blood-brain barrier, which is often intact in parts or all of a brain tumor, will block out many drugs, as it is the purpose of the blood-brain barrier to protect the brain from alien chemicals, and 2) CNS tumors are characterized by marked heterogeneity, which greatly decreases vulnerability to chemotherapy. As a result, many categories of CNS tumors simply have no chemotherapy available. These include, generally, hemangiomas and hemangioblastomas, meningiomas, craniopharyngiomas, acoustic neuromas, pituitary adenomas, optic nerve gliomas, glomus jugulare tumors and chordomas, to name just some. With regard to gliomas, GBM is considered untreatable; no effective agents have emerged for the treatment of GBM, despite 20 years of enrolling patients in clinical trials. It is radiation and surgery which are used for low grade gliomas (e.g. Pilocytic astrocytoma and Diffuse astrocytomas), as no drug has been found effective. There is no drug treatment established as effective for optic nerve gliomas or gangliogliomas. Indeed, very few gliomas of any type are treated with pharmaceuticals; it is one of the categories of cancer that is the least responsive to drugs. Cartilage tumors do not respond to chemotherapy, nor do Cancerous teratomas. Of the thyroid cancers, only one (anaplastic thyroid cancer) can be treated with anticancer agents. The other are treated with radioactivity, surgery, or thyroid suppression hormones. Neuroendocrine tumors of the cervix generally do not respond to chemotherapy. Renal cell carcinoma does not respond to chemotherapy. A number of sarcomas, including Alveolar soft part sarcoma (ASPS), retroperitoneal sarcoma, most liposarcomas (see claim 9), and the assorted chondrosarcomas, are generally considered not to respond to chemotherapy; no chemotherapeutic agent has been established as effective. Many cerebral metastases, such as those from non-small-cell lung cancer and melanoma, are not chemosensitive and will

not respond to chemotherapy. Hepatocellular Carcinoma is, in humans, possibly the most prevalent solid tumor. Despite strenuous efforts over a period of decades, no chemotherapeutic agent has ever been found effective against this cancer.

Applicants' previous indicates that they may not be entirely clear on the purpose of the list. The list is there to explicate the scope of the claims. Applicants state, "All the listed diseases share a property of cell hyperproliferation." Correct; that is how the list was constructed. All cancers for example, involve one or more types of hyperproliferation.

Applicants had earlier pointed to Table 3, which applicants refer to as "a cross-section of cancers. To begin with, five cancers cannot conceivably be a cross-section of cancers generally. Applicants have 2 leukemias, three carcinomas (a lung, breast, prostate), and one adenocarcinoma (colon). There is not one lymphoma, sarcoma, glioma, fibroma, blastoma, melanoma etc. There is not one test for a non-cancerous hyperproliferative disorder.

In discussing the various cancer categories, applicants in their earlier response on page 12-13 again make the point that each one of these involves hyperproliferation. But the notion that any antiproliferative compound can be made to work against any cancer with no more than routine experimentation is without any scientific basis, even though applicants seem to assert that it is true on its face. There are thousands of compounds which have been established as antiproliferative. Hepatocellular Carcinoma is, as noted above, possibly the most prevalent solid tumor. Yet, there is no phrarmaceutical treatment available for this proliferative disorder. Yet, according to applicants reasoning, there should many --- any known anti-proliferative against should work. The fact that there are so many cancers --- indeed, entire categories of cancers, which cannot be treated with any

pharmaceuticals disproves applicants' assumption that simply being an antiproliferative agent means that the compounds can be expected to be effective against cancers.

Applicants had also earlier argued "many compounds are used in more than one cancer." This is certainly true. But there is a huge gap between a compound which can treat several cancers, and one which will treat cancer generally. Applicants state, "Just because no compound is deemed "best for all cancers does not mean that general applicability does not exist." Agreed, but that is not the examiner's argument. The examiner states that there is no compound which is effective against cancers generally, regardless of whether it is best or 10th best. If applicants disagree, they are invited to name the anti-cancer drug they are referring to.

With regard to smooth muscle proliferative disorders, the skill level is very low. Janet R. Maurer, Lesson 23, Volume 14–Lymphangioleiomyomatosis http://www.chestnet.org/education/online/pccu/vol14/lesson23.php is cited as the state of the art for LAM. The article states that it is a "disease of unknown cause" and that "two groups: those with sporadic disease and those with TSC-associated disease." It goes on to say that "LAM remains an elusive disease. Do sporadic LAM patients have a genetic link to TSC patients? What triggers the disease? Why the lungs? ... these are still largely unanswered questions". While there is supportive care, treatment methods are very problematic. The article notes, "It is also not clear whether current treatments influence the course of the disease", which is clear evidence of the very low skill level in this art. The essay notes that "No prospective studies assessing any of these therapies have been conducted because the progression/regression of disease is hard to monitor, and the natural course is highly variable." Further, it should be noted that treatment has involved

"Hormonal manipulation", e.g. "progesterone, tamoxifen or similar agents, luteinizing hormone-releasing hormone, oophorectomy, and radioablation of the ovaries." This is totally unrelated to the alleged method of action of the claimed compounds.

The earlier page 18 traverse on this point is unpersuasive. The above quotes make it abundantly clear that the skill level is low in this area. It is correct that the treatment method explored so far, the use of hormones (which has not been established as efficacious) is unrelated to applicants method, and indeed, the examiner said that explicitly. The point is that the investigation so far of treatment for the proliferative disorder LAM has involved a totally different approach, so that the skill level for using CDK inhibitors for this is even lower, since the area hasn't, so far as the examiner is aware, even been investigated.

Applicants now state on page 15, "In the Office action around page 36 the Examiner steps into the shoes of the FDA." It is not clear precisely what this refers to. The examiner is not requiring that applicants compounds have been found effective in clinical trials. Indeed, the examiner has not even raised the matter. Page 36 discussed the skill level in the art of a standard non-cancerous smooth-muscle proliferative disorder, LAM. It was designed to show that the skill level in this disease is low, and that the use of CDK inhibitors for this proliferative disorder apparently has even been considered.

Applicants continue, "While treatment is claimed, nowhere do the claims state an FDA approvable treatment. Success in the clinic while it may be demonstrative of enablement cannot properly be cited against the present claims. Nowhere does patent law require demonstrated or likelihood of commercial success before a patent is granted. The standard for enablement is a requirement for undue experimentation." Agreed, but the examiner has nowhere required evidence of "an FDA approvable treatment" for these

claims. Nor has the examiner required (or even mentioned for that matter "likelihood of commercial success".

More broadly, the low skill level in the art of proliferative disorders (other than cancers) is seen by the fact that many such proliferative disorders are entities of unknown origins. These include Rosai-Dorfman disease (Sinus histiocytosis with massive lymphadenopathy), Benign prostatic hyperplasia (BPH), Kimura disease, Langerhans cell histiocytosis (LCH), Pigmented villonodular synovitis, essential thrombocythemia, Madelung's disease (benign symmetrical lipomatosis), Castleman's disease, Craniomandibular osteopathy, and Pulmonary capillary hemangiomatosis.

Again here, applicants simply assert that all proliferative disorders can be treated without undue experimentation because applicants compounds are antiproliferative agents. But applicants have not come to terms with the fact that, even aside from cancers, that the opposite has proved to be true. Consider Alzheimer's Disease, which is considered a cell proliferative disorder, and which has been extensively studied. Despite a large array of anti-proliferative drugs available, not one has been made to work against Alzheimer's Disease. Or consider idiopathic pulmonary fibrosis, a devastating lung disease of unknown etiology. No antiproliferative drug has been found; indeed, no drug has been firmly established as effective against the disease itself. Where is the antiproliferative drug found effective against tylosis or retrolental fibroplasia? If hyperproliferative disorders generally could be treated with anti-hyperproliferative agents, these disorders would avh plenty of such treatment. The fact of the matter is, hyperproliferative disorders are extremely diverse, and no agent of any kind can treat them generally because their origins are so different (when known).

Applicants also previously argued that "unifying features such as cellular proliferation are ignored." The term "cellular proliferation" is a very general one, like "protein synthesis" or "cell signaling"; it exists both in normal and abnormal body processes, and it covers a broad range of processes. Most human disease involves proliferation of cells. All infectious disorders, all inflammatory disorders, nearly all skin and bone disorders, and nearly all neonatal disorders, for example, involve proliferation of cells. Shutting down cellular proliferation per se will simply kill the host, since it is essential for normal body processes.

On the matter of restenosis, much the same approach was taken, in which applicants appear to concede that restenosis in some cases does not involve hyperproliferation. But again, the claims do not exclude those choices

On the matter of apoptosis, applicants had stated previously, "With respect to apoptosis, Applicants respectfully submit that there is no requirement in the claim language that the blocking or augmenting of apoptosis has to be in all cells as could be inferred from the Office Action." However:

a) Where did this "or augmenting" come from? The claims say only "preventing apoptosis", not "augmenting".

b) The claim language is "cells", without limitation, and for that matter, the "apoptosis" is without limitation as well, and thus the claim covers all cells involved with all three types of apoptosis (see discussion above of 3 independent mechanisms of apoptosis). And thus, the terms are understood exactly as written. ***Johnson Worldwide Associates Inc. v. Zebco Corp.***, 50 USPQ2d 1607, 1610 states that "modifiers will not be added to broad terms standing alone. See e.g., ***Virginia Panel Corp. v. MAC Panel Co.*** , 133 F.3d 860, 865-66, 45

USPQ2d 1225, 1229 (Fed. Cir. 1997) (unmodified term "reciprocating" not limited to linear reciprocation); ***Bell Communications Research Inc. v. Vitalink***, 55 F.3d at 621-22, 34 USPQ2d at 1821 (unmodified term "associating" not limited to explicit association); ***Specialty Composites v. Cabot Corp.*** , 845 F.2d 981, 987, 6 USPQ2d 1601, 1606 (Fed. Cir. 1988) (unmodified term "plasticizer" given full range of ordinary and accustomed meaning)."

In addition, applicants stated, " Applicants respectfully submit the Examiner's comments relating to too little apoptosis may find mitigation in slowing proliferation of cells rather than proliferating and then inducing apoptosis." The examiner cannot understand the point being made here. The examiner's reasoning is as follows:

A. Some important autoimmune disorders such as lupus and MS and Sjögren's syndrome are characterized by too little apoptosis.

B. Applicants compounds are disclosed to suppress apoptosis.

C. Therefore, these agents would be expected to make lupus and MS and Sjögren's syndrome worse.

If applicants disagree with this reasoning, applicants are asked to identify which lettered statement they find fault with and explain specifically why.

In their next to most recent response, applicants do not address this question. Applicants on pages 14-16 cite and discuss three references, but no copies were provided; the references are not of record and hence this argument cannot be considered.

Applicants argued in that respoonse at the bottom of page 17 that "Lack of FDA approval of a compound has never been grounds to invalidate a claim." The examiner has

never referred to the fact that applicants compounds have not been approved. The examiner is unaware whether applicants compounds have even been submitted for FDA approval. (7) The quantity of experimentation needed: Given the fact that historically the development of new cancers drugs has been difficult and time consuming, and especially in view of factors 1, 4, 5 and 6, the quantity of experimentation needed is expected to be great.

Applicants' primary legal argument in an earlier response was that inoperatives are of no significance. This is not a valid statement of the law.

It is entirely proper to reject claims which have a significant or substantial inclusion of inoperative embodiments, even if there are also included operative embodiments. This is analogous to the fact that rejections can be made under 102 or 103 even if nearly all of the claim is not rejectable. MPEP 2164.08 states, "The Federal Circuit has repeatedly held that "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation'." ***In re Wright***, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993)" (emphasis added).

Applicants indicate on the top of page 16 that they do not understand the connection being made here. It is a basic notion of patent procedure that if some embodiment within a claim is anticipated, then the claim as a whole is rejected under 35 USC 102, even if there are other embodiments within a claim that are not anticipated. The same is true under 35 USC 103, and 112. Thus, in this case, so long as there is a significant embodiment within a claim that is not enabled, the claim is properly rejected for lack of enablement. The examiner's point is that, just as it is true for 102/103, it is also true for 112.

This principle has been demonstrated many, many times. In ***Graver Tank & Mfg. Co. v. Linde Air Products Co.***, 336 U.S. 271, 276-77, 80 USPQ 451, 453 (1949), the

Supreme Court affirmed a finding of invalidity of claims drawn to both operative and inoperative embodiments. ***In re Buting***, 57 CCPA 777, 418 F.2d 540, 163 USPQ 689, and ***In re Harwood***, 55 CCPA 922, 390 F.2d 985, 156 USPQ 673, both sustained rejections of claims encompassing both operative and inoperative applications of a compound. In ***In re Langer***, 503 F.2d 1380, 183 USPQ 288 (CCPA 1974), method claim 11, encompassing both operative and inoperative compounds was rejected, while narrower claims 12 and 17 were allowed. ***In re Cortright***, 49 USPQ2d 1464, 1466 states that claims must be limited to enabled subject matter: "The PTO will make a scope of enablement rejection where the written description enables something within the scope of the claims, but the claims are not limited to that scope." ***Scripps Research Institute v. Nemerson***, 78 USPQ2d 1019 asserts: "A lack of enablement for the full scope of a claim, however, is a legitimate rejection." In ***Bristol-Myers Squibb Co. v. Rhone-Poulenc Rorer Inc.***, 49 USPQ2d 1370, the court held that if the examiner had been told that three of the protecting groups did not work, "the examiner would have been required to disallow those claims of the '011 patent for lack of sufficient evidence or enablement."

A particularly strong statement of this occurs in ***In re Cook and Merigold***, 169 USPQ 298, 302, where the court stated, "We see no reason why the Patent Office ... should not "have authority to reject a broad claim merely because it * * * [reads on a significant number of] inoperative species"". Noting that "during the prosecution of patent applications * * * an applicant is still in a position to amend his claims to exclude inoperative subject matter", the Court further stated, "when the examiner sets forth reasonable grounds in support of his conclusion that an applicant's claims read on inoperative subject matter ... it becomes incumbent upon the applicant either to reasonably

limit his claims to the approximate area where operativeness has not been challenged or to rebut the examiner's challenge either by the submission of representative evidence ... or by persuasive arguments based on known laws of physics and chemistry." The decision makes one exception, when claims have "inoperative embodiments in the trivial sense that they can and do omit "factors which must be presumed to be within the level of ordinary skill in the art," ***In re Skrivan***, 57 CCPA 1201, 427 F.2d 801, 806, 166 USPQ 85, 88 (1970), and therefore read on embodiments in which such factors ***may*** be included in such a manner as to make the embodiments inoperative. There is nothing wrong with this so long as it would be obvious to one of ordinary skill in the relevant art how to include those factors in such manner as to make the embodiment operative rather than inoperative". (emphasis in the original). The ***Skrivan*** situation was one where a "Jepson" type claim did not specifically say that the process had to be done at an operable mixing angle; the Court held that this was "a physical operating condition of an admittedly old process" and hence one of ordinary skill in the art would know how to do the reaction correctly. Such a circumstance clearly does not pertain here.

A particularly extreme form of rejection of claims for inclusion of an inoperative embodiment occurred in ***Ex parte Jovanovics***, 211 USPQ 907, where the method of Claim 1 used a genus of only two (2) extremely similar compounds. The data for one of the compounds was deemed persuasive (and a dependent claim for that was allowed); no data was presented for the other, and hence the rejection was affirmed --- even though the claim had only a single inoperative embodiment. Similarly, ***In re Rainer***, 153 USPQ 802 found lack of enablement on the basis of a single specification example which did not work.

In general, however, the amount of inoperables must be "significant" or "substantial". ***In re Corkill***, 226 USPQ 1005, 1009 states that "Claims which include a substantial measure of inoperatives ... are fairly rejected under 35 U.S.C. §112. ***Durel Corp. v. Osram Sylvania Inc.***, 59 USPQ2d 1238, 1244 states, "if Sylvania had shown that a significant percentage of oxide coatings within the scope of the claims were not enabled, that might have been sufficient to prove invalidity." ***Atlas Powder Co. v. E.I. du Pont de Nemours & Co.***, 750 F.2d 1569, 1576, 224 USPQ 409, 414 states: "[I]f the number of inoperative combinations becomes significant, and in effect, forces one of ordinary skill in the art to experiment unduly in order to practice the claimed invention, the claims might indeed be invalid."

The standard for the examiner challenging enablement is one of reasonable doubt. Thus, ***In re Langer***, 183 USPQ 288 put the standard as when "there is a reason for one skilled in the art to question the objective truth of the statement of utility or its scope." (emphasis added). Similarly, "after the PTO provides evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility" the burden shifts to the applicant "to provide rebuttal evidence sufficient to convince such a person of the invention's asserted utility" ***in re Brana***, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441. The "reason to doubt the objective truth of the statements contained in the written description" standard is set forth in ***In re Cortright***, 49 USPQ2d 1464, 1466. In ***Fregeau v. Mossinghoff***, 227 USPQ 848, all that was needed was a statement by appellant that the invention "is one about which those of ordinary skill in the flavor chemistry art would be skeptical when first hearing of it". In the context of determining whether sufficient "utility as a drug, medicant, and the like in human therapy" has been alleged, "it is proper for the examiner to

ask for substantiating evidence unless one with ordinary skill in the art would accept the allegations as obviously correct." ***In re Jolles***, 628 F.2d 1322, 1332, 206 USPQ 885.

Such a standard can readily be met in such cases:

A. As noted above, ***Ex parte Busse***, et al., 1 USPQ2d 1908, asserted that a claim drawn to treatment of cancer generally "is sufficiently unusual to justify the examiner's requirement for substantiating evidence."

B. The PTO's own examination guidelines as noted above state, "no example exists for efficacy of a single product against tumors generally". This means that even a single such compound would be without precedent, which is reason to doubt the assertion that an entire genus can accomplish this. The reasons for this lie in the great diversity of cancers.

C. There are in fact substantial numbers of cancers which appear to be resistant to chemotherapy. As noted above, possibly the most widespread solid tumor, Hepatocellular Carcinoma, has no effective chemotherapy, nor does Renal cell carcinoma and other examples listed above. Indeed, the Peckham, ed., Oxford Textbook of Oncology Volume 1 (Oxford University Press, 1995), page 452 reference, referring to chemotherapy sates, "the majority of common cancers to not respond to this treatment". That is, even if applicants' compounds were to magically have the combined properties of ALL known anticancer agents, one would still not expect them to be effective against even a majority of cancers, given the current experience.

In rebuttal, the remarks of 9/29/06 had stated, "***Wands*** is instructive that when even a majority of embodiments are inoperative, the experimentation is presumed to be undue", with a later correction putting "not" before presumed. As stated previously, such a statement does not appear in the decision; applicants are again asked to provide a direct

quote to that effect. At any rate, the decision stated "We conclude that the board's interpretation of the data is erroneous. It is strained and unduly harsh to classify the stored cell lines (each of which was proved to make high-binding antibodies against HBsAg) as failures".

Applicants at the bottom of page 18 of the most recent response discuss the analogy to 102 and 103 rejection, but miss the examiner point. The examiner was not discussing a claim which had many required elements, but rather a genus which embraced many embodiments.. Suppose a genus embraced 1000 species, and a reference disclosed just one. A 102 rejection could still be made, even though 99.9% of the claim was not rejectable. That was the examiner's only point.

Applicants point to ***Atlas Powder***, as saying that the number of "inoperative combinations becomes significant", although of course, the issue of "inoperative combinations" does not arise here. As for the "unduly" in that quote, as the examiner noted, "one considers the following factors to determine whether undue experimentation is required". Factor after factor points toward undue experimentation, including the staggering array of largely unrelated diseases, including many diseases that have resisted all forms of pharmacological therapy, the fact that these compounds are not closely related to other agents established as effective, and the fact that these are drawn to some of the most difficult areas of medicine, cancer and autoimmune disorders.

In response to the above legal analysis, applicants earlier stated: "Applicants' argument is that inoperative embodiments are tolerated so long as practicing the claimed invention, e.g., finding the next working embodiment does not require undue experimentation. The examiner understands that this is applicants' position, but does not

agree. For example, such an assertion is flatly inconsistent with ***Ex parte Jovanovics***, 211 USPQ 907, discussed above. There were only two embodiments, and it was exactly determined which was inoperative and which was not. According to applicants' reasoning the claim should have been allowable. Similarly, ***In re Corkill***, 226 USPQ 1005, 1009 states that "Claims which include a substantial measure of inoperatives ... are fairly rejected under 35 U.S.C. §112" --- a flat assertion, without any qualification about "finding the next working embodiment." A similar unqualified statement appears with ***Scripps Research Institute v. Nemerson***, 78 USPQ2d 1019: "A lack of enablement for the full scope of a claim, however, is a legitimate rejection."

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See ***In re Goodman***, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); ***In re Longi***, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); ***In re Van Ornum***, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); ***In re Vogel***, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and ***In re Thorington***, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3-10, 12-16, 18-19, 21-35, 48-49 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 6861524. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims here are just generic to the species already patented in the parent case. The method claims are also rejected, because there

was no restriction in the parent, and method claims are not patentably distinct form compound claims. See ***In re Boylan,*** 157 USPQ 370 [The patent had a composition of matter and a method of making it; the application had the method of use]; ***Ex parte MacAdams***, 206 USPQ 445 [The patent had a composition of matter; the application had the method of use]; ***Geneva Pharmaceuticals Inc. v. GlaxoSmithKline PLC***, 68 USPQ2d 1865 (CA FC 2003) [The earlier patent was drawn to method of use, the later three patents, held invalid in "Geneva II" were drawn to somewhat narrower versions of the composition of matter].

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, THIS ACTION IS MADE FINAL even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Berch whose telephone number is 571-272-0663. The examiner can normally be reached on M-F 7:15 - 3:45.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James O. Wilson can be reached on (571)272-0661. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0198.

/Mark L. Berch/
Primary Examiner
Art Unit 1624

12/4/2007